Homén finds distinct evidence of the beginning degeneration in the axis-cylinders three to five days after the operation of cutting the cord. He distinguishes the true secondary degeneration from the traumatic degeneration which occurs near the point of section, by the presence in the latter of shining masses of exudation which do not absorb the staining material.

The various tracts do not degenerate simultaneously. The process begins in the posterior columns, and attacks their entire longitudinal extent from the first; later, the lateral column and anterior median column are affected, and last of all the direct cerebellar column. The column of Clarke was thought to be somewhat smaller, the number of fine fibres being decreased, and the number of cells being reduced, in one case in which the operation was unilateral. A comparison of these experimental results, with the observations upon a number of human cords in which degenerations had occurred, has convinced Homén that the process is the same in both. If this is so, his conclusions as to the time, order of progression, and exact histological changes in degeneration are valuable, and should lead to an examination for secondary degenerations, in recent as well as old cases of spinal-cord disease.—*Fortschritte der Medicin*, 1885, No. 9.

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b.—PHYSIOLOGY OF THE NERVOUS SYSTEM.

THE CONDUCTION OF EFFECTS OF IRRITATION FROM THE CEREBRUM TO THE EXTREMITIES.—Dr. Lewaschew has made a series of experiments upon this subject. He has not studied the effects upon the movements on the opposite side, but those on the same side as the irritation. All the experiments were made upon dogs under morphia, or morphia and chloral, with the induction current applied to the cerebral cortex. The movements of the posterior extremities were observed. If the cortex of the left hemisphere is irritated, then the weakest current calls out movement in the right extremity. By stronger currents the opposite posterior extremity is also moved. The inquiry arose, by what paths of conduction in the spinal cord was the irritation conveyed to the extremity on the same side as the irritation? In a dog, after both hemispheres were laid bare in the vicinity of the sulcus cruciatus, the spinal cord was hemisected on the left side at the level of the eleventh dorsal vertebra, so that the path of conduction only remained by the right half of the spinal cord. If, under these circumstances, the centre for the posterior extremity in the left hemisphere was irritated, then the result for both posterior extremities is the same. Hence the conclusion that the conduction from a hemisphere to the posterior extremity on the same side is not accomplished by conduction in the half of the spinal cord of the same side. Both posterior extremities have their primary centres in the lumbar part of the spinal cord. The

irritation which arises in one hemisphere goes within the medulla oblongata to the other half of the spinal cord and in this to the lumbar cord. If, in the above experiment, with left spinal hemisection, irritation of the cortical centre of the right extremity is made, then the left extremity is quiet, whilst the right is extended. Here the excitation goes first from the right hemisphere to the left half of the spinal cord, and from this above the level of the spinal section back to the right half of the cord. The transit from one to another half of the cord, through the gray substance, can take place at every level of the spinal cord. It has just been stated that after hemisection of the spinal cord the extremity on that side was quiet when the hemisphere of the opposite side was irritated, but it must be added that by strong irritation muscular contraction would ensue.—*Pflüger's Archiv*, Band xxxvi., Heft 5 and 6.

THE MINIMAL INTERVAL AT WHICH THE SUMMATION OF TWO MAXIMAL STIMULI OCCURS IN STRIATED MUSCLE.—Dr. Yeo and Mr. Herroun have made a series of experiments upon this point with frogs.

It was discovered by Helmholtz that the shortest interval at which he could appreciate the effect of a second stimulus, when two succeeding induction-shocks were allowed to enter a nerve, was $\frac{1}{600}$ of a second. Their results were as follows :

1. When two induced currents, each capable of causing a maximal contraction, enter a muscle in opposed directions, the stimulating effects are not summated at smaller intervals than $\frac{1}{150}$ of a second.

2. When two induced currents enter a muscle in the same direction, or two ascending currents enter a nerve, there can hardly be any limit fixed as a minimal time interval at which their effect is summated.

3. Degrees of fatigue which cannot be recognized by the effect on the general irritability of the muscle, or the form of the curve, are sufficient to prevent stimuli giving rise to summation at small intervals.

4. The most important time in determining the summation of stimuli applied to the nerve is the relative strength of the first and second stimulation. The first stimulus must not exceed the second in strength if summation at very small intervals is desired.

5. In stimulating the nerves with our coils two ascending currents are more effective in causing summation than two descending currents.

6. In indirect stimulation summation is soonest arrived at (with interval increasing from zero) when the part of the nerve near the muscle is stimulated first in point of time.

7. Beyond the short interval during which current interference comes into play, we do not get a subtraction from the height of the contraction given by a single maximal stimulus with two maximal stimuli with any direction of currents.